MEDIALERT-IOT ENABLED MEDIALERT SYSTEM USING RTC FOR INTELLIGENT PILL REMINDERS AND AUTOMATIC DISPEMSING SYSTEM

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ABSTRACT

The main aim is to make a Smart medicine box for those users who regularly take medicines and the prescription of their medicine is very long as it is hard to remember to patients and also for their care giver. Also Old age patients suffer from problems of forget to take pills on proper time which causes certain health issues for patients having Permanent diseases like diabetes, blood pressure, breathing problem, heart problems, cancer diseases etc. So, patient can know the specific number of box from whichhe has to take out medicines.All pill boxes are pre-loaded in the system which patient needs to takeat giventime.To enhance functionality, our system incorporates RPS power supply, Real-Time Clock (RTC), and IoT connectivity via Bluetooth. A user-friendly Android app facilitates timer settings, allowing users to configure medication schedules conveniently. The entire system is implemented with embedded C code, ensuring efficient and reliable operation.Thus, final result of our system provides fast curing of patient healthby using our advantageous system. Some people may forget to take the medicines at the correct time and can forget the medicines which they have to take. So in order to help them with this liability we have developed this project.

1. INTRODUCTION

Given a purpose, the Internet of Things (IoT) is not only a concept but an architecture that facilitates the interconnection between people, systems, and devices of any kind. When the resources amalgamate with respective people, it can solve issues known to humanity for several years. Medication nonadherence is expected for patients with chronic infections, concerning as many as 40% to 50% of patients prescribed medications to manage chronic conditions like diabetes or hypertension. This nonadherence to specified therapy is thought to cause at least 100,000 avoidable deaths and $100 billion in avoidable medical costs per year. The issues which have not been solved throughout decades have the power to be fulfilled through concepts of IoT. An IoT helps us create an environment enabling the growth of the products and aiding humanity regarding the issues it chooses to address. Embedded software in these devices adheres to its functionality and helps us deal with ever-growing challenges.

It allows us to create a connectivity port for the communication device. These devices are further connected to an extensive system wherein software integration with business modules such as Enterprise resource planning, Customer relationship management, etc., can also be added. Patients who are differently-abled or are taking more medications after discharge from the

hospital may benefit from targeted interferences to observe and improve medication compliance. With the advent of technology, continuing at the same pace in any sector has become inevitable. Every industry is adopting a digital approach, from shelters to homes, clinics to hospitals. With the ultimate surge of the Covid-19 virus across the globe, the technical sector boomed with resources to rescue all. In the health sector, it has become essential to control the consumption of medicines and the time the patient takes them. Therefore, an essentially proper schedule needs to be followed, and the quantity also needs to be regulated. The risk of overconsumption or under consumption may lead to unprecedented circumstances over time. Antimicrobial resistance has become a global problem primarily because of overuse, and misusage of opioids has shown to be an obsession epidemic in some nations. There are also chances of developing adverse drug reactions if a different medicine is provided due to human error, especially with people who are administered multiple prescriptions throughout the day. Thus, to solve these issues, especially among the elderly, there are vast chances of forgetting medicine schedules and repeatedly consuming the same medicine more than prescribed. Therefore, we present the "Medicine Dispenser" in the proposed paper a result of this.

The "Medicine Dispenser" uses Arduino Mega, which connects with various system components to create a complete circuit. Pills are contained in the respective compartments. The admin sets up time in context to each container concerning the medication. At the given time, the alarm buzzer rings, and if the authenticated user unlocks the system, the pills are dispensed. However, a group of professors has conducted a study (Mahoney, Grey, and Blough) at the University of Washington regarding medicine compliance. The people who need to take lots of drugs daily will find it delicate to flash back the time and drug details. For those people, drug input at the right time is the veritably most important thing. Home healthcare plays a major part in reducing the consumption of treatment. People can get the services fluently through advanced health care technologies. Through IoT, we can give better treatment because medical fields are more functional than other fields. So IOT is stopgap in the healthcare field. In real- time monitoring, cases can ameliorate their quality of health. In three residence healthcare agencies, 147 more senior citizens carried more than two medicines, which caused 30.6% of volunteers to be adherent, and 18.4% of participants were over devotees with at least one medication. Among other more significant causes of death for various people, medication nonadherence to prescribed medicines causes $100 billion in preventable medical costs in a year and at least 1,00,000 avoidable deaths. Thus, the present paper proposes a prototype of an IoTbased model of a medicine dispenser using fingerprint authentication.

PROBLEM STATEMENT

- Medication Non-Adherence: Develop a system that utilizes IoT and real-time clock (RTC)technologies to address the issue of medication non-adherence by providing timely reminders and monitoring drug administration.
- Patient Safety: Create a smart drug administration system that ensures patient safety by integrating IoT sensors to detect potential adverse reactions, ensuring the right medication is administered to the right patient at the right time.
- Inventory Management: Implement an IoT and RTC-based solution to track medication inventory in real-time, providing alerts for low stock levels and expiring drugs, improving efficiency in healthcare facilities.

2. LITERATURE REVIEW

W. Antoun et al (2018, March). The technique of the suggested prototype system is described in this section. The SMD design and its external peripherals are explained. In this study, we developed an Android application that is in charge of managing the entire system.

F. Kleinsinger et al(2018). Thescience of human behavioural modification can be used to help patients adopt healthier lifestyles and create healthy habits in order to help patients adhere to taking their prescriptions more consistently.

K. Karthikeyan et al (2021, October).A study suggested deploying a separate bot to oversee the administration of medications. The bot will move to the user's home and dispense the necessary medications in accordance with the user's preprogrammed orders.

Latif, G. etal (2020). proposed design After seeing so many of these cases the correct person must take the correct pill at the correct time, otherwise taking an incorrect one or not taking one at all may expose thepatient to several dangerous situations, ranging from mild health issues up to death.

Neiman, A. B. etal (2017). Given a purpose, the Internet of Things (IoT) is not only a concept but an architecture that facilitates the interconnection between people, systems, and devices of any kind. When the resources amalgamate with respective people, it can solve issues known to humanity for several years. Medication non adherence is expected for patients with chronic infections, concerning as many as 40% to 50% of patients prescribed medications to manage chronic conditions like diabetes or hypertension.

Pandey, P. et.al (2018, June). Design proposed system Smart Medicine Dispenser (SMD) was also developed, containing all the recommended dosages for a fortnight or a month and dispensing them at the correct timings with the correct quantity.

Rao, A. et.al (2020, July).methodology of proposed system. An IoT-based programmable innovative medicine kit guides users/nurses to manage the precise medication at the correct time schedules through a unique alarm system that includes buzzers, mobile notifications, and LED signals on the equipment sections. The parts containing suitable tablets are unlocked at the prearranged time.

Samhitha, S.et.al (2019). Proposed prototype system. In the study, NodeMCU ESP8266, an Android; microcontroller with an inbuilt Wi-Fi component, is utilized for development. The Xcluma 28Ybj-48 stepper motor is used to rotate the medicine container. The stored history is also displayed to the user, which has the list of alarms successfully given the alarm, and the rotation of the container completed successfully. A medical alert is sent to the caretaker via a notification using the Android Application if the medicine is not taken within a specified time and specified dosage.

Salama,Dr-Diaa&Abd-ELfattah, (2018) Mohamed et.al Proposed prototype system. After seeing so manyof these cases,the correct person must take the correct pill at correct time, otherwisetaking an incorrect one or not taking one at all may expose thepatient to several dangerous situations, ranging from mildhealth issues up to death.

Shaikh S.A.et.al (2021) Designed The Medicine reminder system consists of a pillbox provided with a set of compartments. It is designed in such a way that normal people can use it easily for their medication. The pill box's control system consists of LEDs for giving visual alerts to the patient for medicine. There is a buzzer in the system which alerts the patient in audio form.

Savithaa. N et al (2021) had designed a smart medicine box which had an android application which is installed on the patient's smart phone. Through this application patients could view their prescriptions and get notifications regarding medicine intake. Medicine box is provided with different compartments. An LED on top of each section signify the right box. At any moment patient opens a mistaken section, a warning will occur with the help of Arduino. A WI-FI shield is attached to the Arduino board and this microcontroller picks up the data and sends it through WI-FI module. These compartments are opened or closed by servo motor by means of electrical signal arrived from Arduino microcontroller. The device is programmed with Arduino which is plugged with alarm and LED display. Smart medicine box attached with vital parameter measuring sensors is implemented with IoT technology. Doesn't recover special training for handling. It is a user-friendly device even elder patients can operate easily. The instructions are displayed in LCD display

Divya Sai. K et al (2021) had designed a medicine box where the schedule data/configuration data is sent to the pill box through IoT. The smart pill box contains Arduino MCU, LED display, LEDs, buzzer, buttons, Pulse Sensor and Temperature Sensor.The LED are used to display the commands in pill box by MCU. The Wi-Fi module is configured with IoT. The configuration data is send to the smart pillbox when the configuration is in ON mode. The concerned LED glow with buzzer at schedule time. It is cost efficient and user friendly as user can set time table of medicine by himself. Highly reliable and the product can be used for long time. It is easy to use and manufacture It also provides accurate result

Anandhapadmanaban .S et al (2020) used Peltier module which is imported into one of the compartments made for cold storage and other compartments left without Peltier for room temperature storage. According to medical adherence, box is splitted to store drugs to be taken thrice times in a day. The patient's vital signs namely body temperature and heart beat rate are sensed and sent via sensor probe. An additional switch is built to alert the preset guardian through GSM module when it is triggered by strangers or guardians at emergency situation. Cloud storage 4 assists doctors to analyze the patient's health graph and gain knowledge about the recovery or degradation of their patient's health. By these knowledge doctors easily prepare their treatment plan earlier for his/her patient

Nur Zulaikhah Nadzri et al (2020) designed the device in such a way that the user will set the time according to the medicine scheduled by the doctor by using the Blynk apps. Then, if the time is correct it will notify by 2 notification, LED and buzzer is on. Magnetic switch is used to detect the action of opening and closing the iBox cover. LDR to detect the action of taking the medicine If the user takes the medicine, the data will be stored in the cloud and this is triggered by the reed switch

Harshitha V et al (2020) created an IoT device is designed to remind patients about their medication time. By using the GSM, the caretakers can be notified through smart phones. Sensors like IR sensor, camera, and RFID tags are used to count the number of pills inside a tray and whether medicines has been taken properly These are interfaced with Arduino UNO micro-controller. The RFID stickers fastened on each tablet sheet will be scanned by using the RFID, camera and IR sensor. The sensors will be giving the count of pills inside the box periodically for every 5 to 6 hours. The timings for the intake of medicines by the patient will be set using RTC. By using RFID tags the pills which are taken can be identified, whether the patient has taken correct medicine or not at a prescribed time. The data will be updated into the web browser using

the Wi-Fi module. After completely taking the medicines over days/months the device will be fixing an appointment with the doctor automatically by sending a message using the GSM module and also convey the same to the medical shops to deliver the required medicines to patients address or to the hospitals. Focuses on alerting the users, care-takers about the medicine intake time of the patients. When the pill box becomes empty it sends a purchasing notification to the medical shop about the medicines that has to be purchased. The device also fixes an appointment with the doctor when the usage of medicines is completed.

Viral Doshi et al (2019) made a device which consisted of a small box divided into 21 sections for storing pills for a week of up to 3 patients. The box was connected to an RTC module, an Arduino AT mega 2560. The RFID tag will be given to each patient. When it is brought close to the reader, the medication will be dispensed. RTC is used to compare the time the dosage is to be given with the current time. It will check whether the RFID tag is read by RFID reader. If the condition is true. The 5 box will open about 60 sec and then the section will be closed, also it will store data as DOSAGE TAKEN. It will then go back to monitor the current time. If the condition is false and 30 sec after the notification was sent are completed the LED and BUZZER will be turned off. It shall then check for the current time is equal to set time + 5 minutes, if the condition is true, the patient will receive the second reminder. The LED and BUZZER will be turned on again for 30 sec. If the RFID tag is not detected the data would be stored as dosage missed. WIFI-module is used in sending the results which will be stored in the database.

Akshaya. C et al (2019) made a medicine kit that has individual compartments that can be filled with medicines and designed in a way to fill medicines when the compartments are empty. When it is time for medication the medicine box drops the pills and sounds an alarm with notification until we take the pills .The setup is interfaced with servo motor and a GSM module to provide notification. A speaker module is connected to the ATMEGA 328. Then the LED on the pillbox glows and an alarm is also generated indicating which pill should be taken. The microcontroller is interfaced with two output modules. The LCD module for display operations and Buzzer for alarm function. Additional. The GSM module is connected via the UART. The GSM module is interfaced to the controller for sending messages to the patient as an alert system. The numbers to be accessed by the GSM is read from the microcontroller's memory.

Nausheen Fatima et al (2019) designed a device which had visual indicator which would light up along with the speaker. Also had a buzzer which will give a loud auditory indication that the medicine needs to be taken. A mobile app will give details about whether the patient has taken medicine or not for that time. It also has Heart beat sensor and temperature sensor. The Real time clock inside the LPC2148 will update the registers. The registers are then loaded to the RAM of the LCD and hence displayed on the Screen.

Deepak Bhatt et al (2018) made an automated medicine box, operated by the ESP8266 microcontroller. This controller has an in-built Wi-Fi module which can connect to a smart phone. The microcontroller is programed such that whenever it is powered ON, it will connect to the smart phone through Wi-Fi. The microcontroller will attempt MQTT connection with smartphone's android application. Once the MQTT connection is established, the user can update the schedule of medicines. The medicine timings will be stored even if the microcontroller is powered OFF Microcontroller checks for the respective medicine type once the medicine type is determined, the microcontroller will eject the respective medicine's tray. After the timer of 1

minute, the medicine tray will get back automatically. This process keeps repeating to serve the purpose of smart medicine box. The proposed system helps to remind the patients to take the correct medicines at the correct time. This system just requires the patients to update the prescribed time through an android application of their smart phone and subsequently the smart medicine box will automatically dispense the correct medicine

Roy Abi Zeid Daou et al (2018) designed one in which the weight of the pill is monitored using a safety weight sensor system. The Processor does the calculations to check if the patient has taken the medication on time or not. For this a safety-related 1oo2 architecture is targeted (one out of two) channels are connected in such a way that one of them is sufficient for triggering the safety function. a safety-related weight sensor system is used. Not failed- the processing units will unlock the medicine box, send alarm, and determine the number of used pills. On failure-, the system will trigger the safe function which is defined in sending a message to the patient and to the ones using the phone application The suggested system is able to measure the weight of the pills, monitor the medicine intake, and remind the patient to take their medication during the allotted time. It's a device that only unlocks through the application, it is safe to keep it anywhere as it is out of the reach of children

Diaa SalamaAbdul et al (2018) their device was able to logs the pill name, number of pills and hours at which each pill is actually taken versus the time it should have been taken. Emitting warnings to the owner's relatives or nurses if needed. The pills 7 box contains nine separate sub-boxes so can have 9 distinct pills. Has 3 parts The pill refilling mechanism, the pill dispensing mechanism and the electronic module. Also has a pill tray where each one of the pills will exit the pillbox. Pill is dispensed once the patient presses the button When it has to be discharged the pipe will be aligned with the hatch opening (outlet) the pipe then rotates, aligning the empty compartment of the pill storage with the hatch opening, preventing any other compartments to be aligned over the hatch.

starts generating loud sound and forces the user to take pills again.

3. PROPOSED SYSTEM

The proposed medicine drug admin system is integrated of both hardware and software. This system used IOT android based RTC time, buzzer and ESP32 model microcontroller, regulated power supply section for sign conversion system using python programming. When the set time is match with controller data base time then automatically medicine box will open to consume medicine pill.

A smart system that will continuously cover the case's health with the help of a detector and also at the same time will cover the patient diurnal cure of drug. Each drug box will have its own set of timing information which will be compared to a real worldclock. However, the buzzer will go out and thereby remind the case to take his/ her drug, If the information matches. A data will also be maintained regarding the case's health and his diurnal input of drugs. Propose a smart system that will continuously cover the case's health with the help of a detector and also at the same time will cover the cases daily cure of drug Each drug box will have its own set of timing information which will be compared to a real worldclock. However, the buzzer will go out and thereby remind the case to take his/ her drug A data will also be maintained regarding the case's health and his diurnal input of drugs, If the information matches.

The 16x2 LCD serves as the interface through which the user can select the compartment for which they want to set the time, they can select

the time for 3 compartments titled med 1, med 2 and med 3. This is done by the help of the rotatory encoder which acts as the knob by turning the knob clockwise and anticlockwise we can scroll through the list of options provided. The time that has been selected by the user will then be displayed on the LCD for a min or two and then will move to the default screen which displays the current date and time The time that has been selected will be stored in the eeprom of the arduino and at that time set, the buzzer and the led which serves as the audio and visual indicator respectively is activated. There are 3 LED present to indicate the 3 compartments and only the LED corresponding to the compartment will glow so the patient can know that it's time and which compartment they have to reach out for their medication.

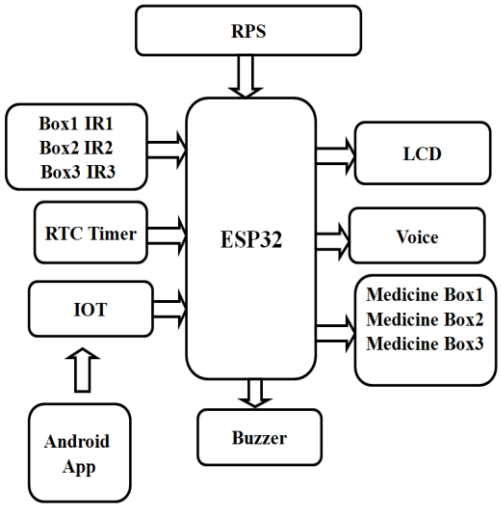


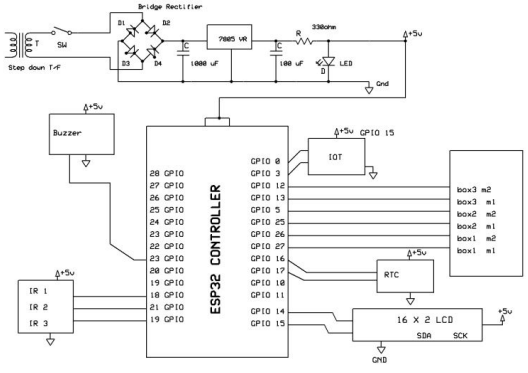
Fig.1.Block diagram

The RPS module converts the 230 ac volts into 5v of dc. The5v of power supply goes to all components in the system. The input of the project is RTC and IOT module. The RTC has CMOs battery and RTC circuit and it counts the time and opens the medicine box. The IOT server can send the data and display the data in the IOT server app. The output has LCD, Buzzer alarm and dc motor, In the Arduino microcontroller contains the software programming code Embedded C. The main purpose of the microcontroller is the data can be control by the microcontroller.

Once we should ON the kit first Reset the kit because to connect wifi to IOT server. The kit is reset the LCD displays the Medicine Remainder. After we configure to IOT server by using an TCP Telnet Terminal app. By using our mobile phone we can connect the wifi to IOT server. Once the wifi is ON the mobile data should be OFF. By using the IP address 192.168.4.1 and port:23 connect the IOT server. Once it is connected the LCD displays the present Date and Time.

Next we can the set the time for reminding the Medicine we can use the command like @HH:MM:SS# . We can give the Eight commands first we can save and then send the LCD displays the configurations of reminders. The first two commands are getting the same voice and similarly the next six commands also. The next command is for the reminding purpose. Not only giving the voice we can also see the name of the medicine on the LCD and at the same time IOT app.

In real time once we can set the commands it working on 24/7 until the power is OFF. Suppose the power is OFF we can again set the commands.



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Arduino sketch that functions as a medicine drug admin system using an Arduino board, a Real-Time Clock (RTC) module, a Liquid Crystal Display (LCD) module. The system is designed to remind users to take their medication at specific times by displaying messages on the LCD and dc motor opens the medicine box. The proposed system designed to configure and manage medication reminder times, display the current date and time on an LCD, and trigger dc motor boxto remind users to take their medication. It uses an RTC module to keep track of time and EEPROM memory to store configuration data. However, there are a few issues with the code, such as incorrect variable names and potential logic errors, which might need further debugging and refinement for the system to work correctly. not used in the provided code. It seems to have been intended to set up a WiFi connection.

The LED and the buzzer can be switched off with the help of a button and if that's not the case they automatically stop after a min Another button is present which controls the micro servo motor that serves the purpose of opening the box and for sending the SMS to the guardian based on the button input a SMS will be sent. For instance if the button is not pressed the box remains in the same place as such a conclusion can be drawn, that the patient has Fig 4.3.1.1 Proposed system 14 failed to take their medication at the specified time and so an SMS will be sent to indicate this. On the other hand if they press the button the servo pushes the box forward and so the patient has taken said medication and hence a corresponding SMS will be sent to convey this information to the guardian/caretaker.

4. RESULTS

Fig 1: Over all Hardware Implementation

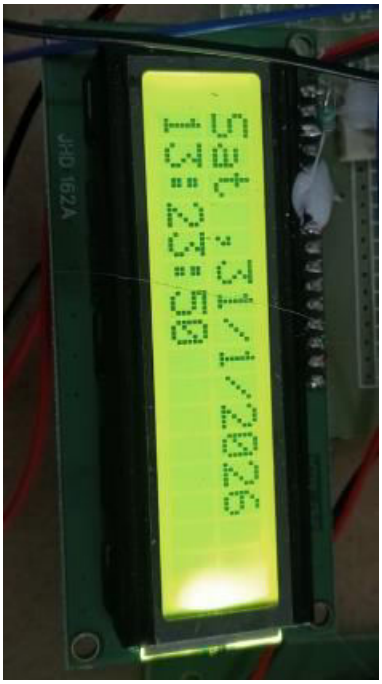

Fig 2: Time and date Displaying on LCD with RTC Module

5. CONCLUSION

Overview of the project is "IOT RTC based smart drug admin gives the medicine box automatically open and close for easy consumption of medicine at correct time." the main aim of the project reminding the medicine for the people who are having the health problems Mentally elderly and Physically. In this project we are using the RTC timer and IOT module transmitting the data. And

the data can be controlled by Microcontroller. By using the wifi connect the IOT server. The data can display on the LCD display and at the same time IOT server. The medicine box will be open through the dc motor module.

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